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Feature Article - Review of the Experimental Composite Leading Indicator

INTRODUCTION

The ABS's experimental Composite Leading Indicator (CLI) was introduced in June 1993 to assist in the early detection of turning points in the business cycle in Australia. The **reference series** for the CLI is the deviation of the trend growth rate in constant price Gross Domestic Product (GDP(A)) from its historical long-term trend growth rate. At the time of its introduction in June 1993, the last turning point in the CLI was a trough in the March quarter 1991, which led the corresponding turning point in the **reference series** by two quarters. However, that particular trough in the **reference series** has since been revised, and the CLI now leads by one quarter at that turning point.

Until the March quarter 1991, the CLI has predicted turning points in the **reference series** with a two quarters lead on average, see Table 1. However, its performance appears to have deteriorated since then. This article presents the results from a review of the performance of the CLI and its components, and provides some possible explanations for the deterioration in the performance of the CLI in recent times. This analysis is based on the March quarter 1997 data.

MAIN FINDINGS

- The cycle in the deviation of GDP(A) trend from its historical long-term trend from the June quarter 1994 to the March quarter 1996 was strongly driven by the farm sector.
- Since the CLI does not have a farm production related component, it is not well equipped to predict farm sector driven cycles. Rather, it is likely to lag the **reference series** and pick up the signals when they have fed through to other sectors in the economy. A similar lag was seen in another farm sector driven cycle in the mid to late 1970s.
- The inverted real interest rate was the only component which predicted all three turning points in the latest cycle in the deviation of GDP(A) trend from its historical long-term trend.
- However, the lead time for inverted real interest rate in the latest cycle has reduced from seven quarters on average in the 1970s and 1980s to just two quarters. This reduction in lead time may reflect an increased responsiveness to monetary policy, but may also have been affected by the farm cycle.

PERFORMANCE OF THE CLI

Table 1 shows the identified turning points in the CLI and in the **reference series**, which is the deviation of GDP(A) trend from its historical long-term trend. Data as at the June quarter 1993 and the March quarter 1997 were examined. Although there has been no revision in timing of the historical turning points in the CLI since June 1993, two turning points in the were shifted to one quarter earlier (in bold).

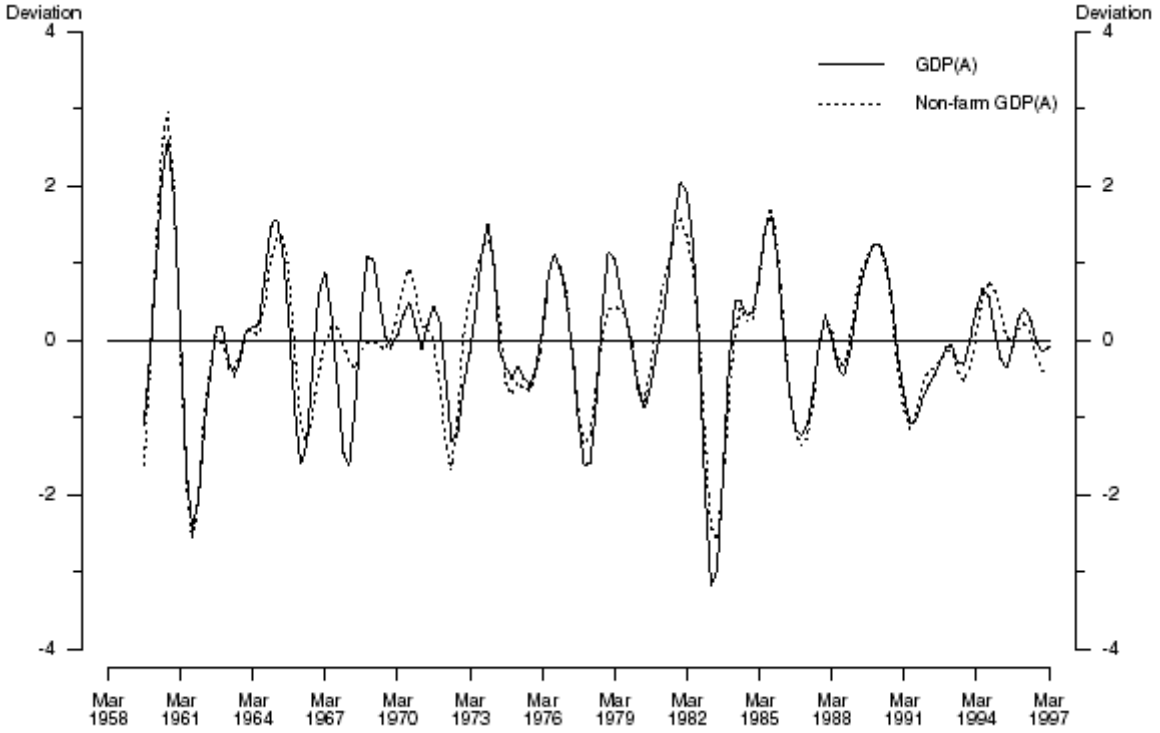
TABLE 1. TURNING POINTS OF THE CLI IN RELATION TO TURNINGS POINTS IN THE

REFERENCE SERIES

	CLI	Lead/ lag in hte number of quarters as at the Dec quarter 1996	GDP(A) as at the Jun quarter 1993	GDP(A) as at the March quarter 1997
Trough	Dec 71	2	Jun 72	Jun72
Peak	Mar 73	3	Dec 73	Dec 73
Trough	Mar 75	2	Sep 75	Sep 75
Peak	Jun 76	1	Sep 76	Sep 76
Trough	Mar 78	-1	Dec 77	Dec 77
Peak	Mar 79	-1	Dec 78	Dec 78
Trough	Jun 80	0	Jun 80	Jun 80
Peak	Jun 81	2	Mar 82	**Dec 81**
Trough	Dec 82	1	Mar 83	Mar 83
Peak	Mar 84	6	Sep 85	Sep 85
Trough	Sep 86	1	Dec 86	Dec 86
Peak	Dec 88	4	Dec 89	Dec 89
Trough	Mar 91	1	Sep 91	**Jun 91**
Peak	Jun 94	0	na	Jun 94
Trough	Sep 95	-1	na	Jun 95
Peak	-	-	na	Mar 96

GRAPH 1. GDP(A) AND NON-FARM GDP(A)

Deviation from Trend



Three additional turning points in the **reference series** have been identified since June 1993. The March quarter 1997 update of the CLI showed that the CLI was coincident with the J**une quarter 1994 peak** in the **reference series**, lagged by one quarter at the **June quarter 1995 trough** in the **reference series** and has not shown signs of a turning point corresponding to the **March quarter 1996 peak** in the **reference series**. The deterioration in the prediction of the last three turning points in the **reference series** raises questions about the predictive performance of the CLI.

The CLI is calculated as a simple average of the short-term movements in eight indicators, selected on the basis of their having provided early signals of turning points in the business cycle during the 1970s and 1980s. Because the evolution of each expansion and slow-down in activity presents a unique combination of features, none of the individual indicators has had an unvarying or perfectly stable leading relationship with the **reference series**. Being a “composite” of the early signals of the eight components means that generally, the CLI has a better chance of predicting turning points in the business cycle than the individual component indicators. However, the predictive performance of the CLI depends on the relationship between its components and the factors driving the movements in the business cycle.

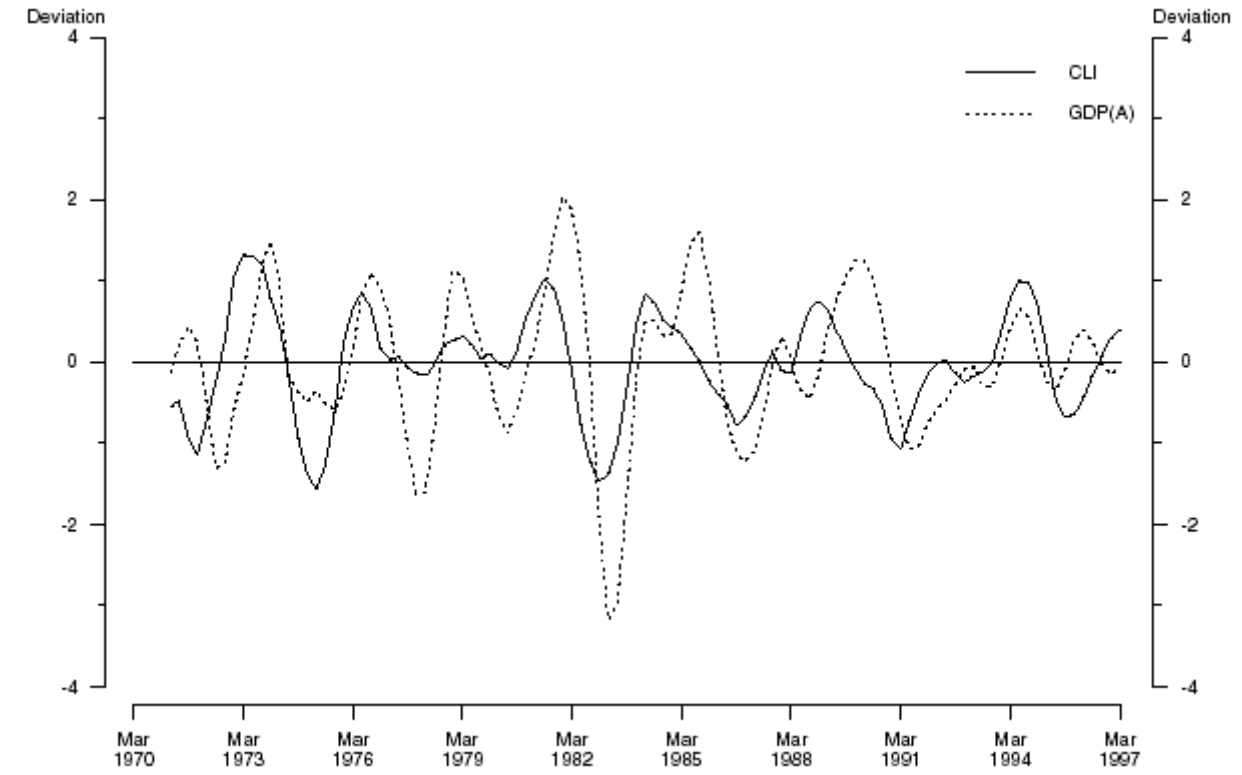
THE FARM SECTOR-DRIVEN CYCLE

Strong movements in the farm sector were a major factor behind the last cycle in the **reference series**. A study reprinted in the January 1997 A**ustralian Economic Indicators** found that the good farm season in 1995-96 contributed 1.3 percentage points to the growth of the seasonally adjusted constant price estimates of GDP(A) between the June quarter 1995 and the June quarter 1996. Of this contribution, 0.8 percentage points were due to the primary effect of growth in gross farm product; 0.2 percentage points was due to the combined secondary and tertiary effects of growth in farm intermediate inputs, wholesale trade and transport; and 0.3 percentage points were due to the tertiary effect arising from higher final expenditures by farmers (ie. 0.5 percentage points contribution to non-farm gross product).

It appears that it is possible for a cycle in the **reference series** to reflect predominantly the movements in production by the farm sector. Graph 1 compares the **reference series** with an alternative calculated using only the non-farm component of GDP(A). While the **reference series** shows a clear cycle between the June quarter 1994 and the March quarter 1996, the non-farm component shows a peak in the September quarter 1994, followed only by a double turn. Marked differences in the amplitude and the timing of turning points between the two series were also observed between mid-1960s and early 1970s. However, in the farm cycle between the trough in December quarter 1977 and the trough in the June quarter 1980 in the **reference series**, the differences between the two series were only small.

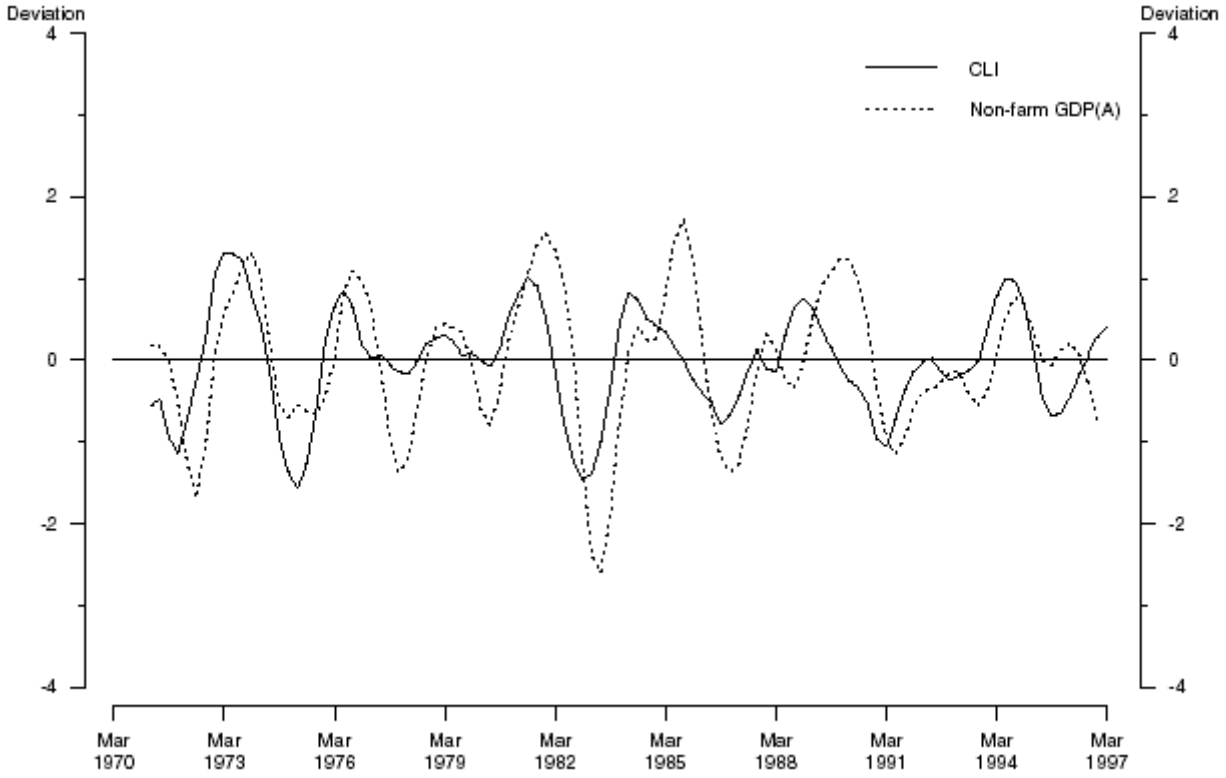
Graph 2 shows the CLI and the **reference series**. Table 1 and Graph 2 show that the CLI has difficulties predicting turning points in the **reference series** which are driven by the farm cycles. However, this problem appears to be somewhat reduced when the CLI is put against non-farm GDP(A) trend against its historical long-term trend, as shown in Graph 3. In the latest farm cycle, the CLI led non-farm GDP(A) by one quarter at the September quarter 1994 peak. The CLI viii July 1997, Australian Economic Indicators showing a trough in the September quarter 1995, but non-farm GDP(A) has not yet shown a corresponding trough. This suggests that the CLI will show a long lead against the forthcoming trough in non-farm GDP(A). However, this lead is longer than usual for the CLI. With regard to the farm cycle in the 1970s, the CLI is coincident with the March quarter 1979 peak and the June quarter 1980 trough in non-farm GDP(A), but maintained a one quarter lag at the December quarter 1977 peak. This indicates that for that particular cycle, switching from the to non-farm GDP(A) makes little difference to the predictive performance of the CLI, possibly because of the flow on effects to the non-farm sector.

GRAPH 2. COMPOSITE LEADING INDICATOR (CLI) AND GDP(A)
Deviation from historical long-term trend



GRAPH 3. COMPOSITE LEADING INDICATOR (CLI) AND NON-FARM GDP(A)

Deviation from historical long-term trend



The main reason for the CLI's difficulties in predicting farm cycles is that since there is no rural production component in the CLI, the effects of a farm sector- driven cycle are unlikely to be picked up by the CLI until they feed into other sectors of the economy. The ABS has investigated the possibility of including a farm production component in the compilation of the CLI to pick up farm production-driven cycles in the future. However, it was found that farm production has only

led the **reference series** in a cycle in the mid-1960s, and in the latest farm cycle, but does not lead at the other turning points. Therefore, including a farm production indicator in the CLI tends to worsen its overall performance. A preferred alternative is to publish the CLI against both the **reference series** and non-farm GDP(A), providing users the additional information of how the CLI is performing with respect to the non-farm sector of the economy.

THE COMPONENTS

Table 2 shows the leads and lags (in the number of quarters) of individual components relative to the following the March quarter 1997 update of the CLI. '-' indicates that the component series has not shown a turning point corresponding to the **reference series**. As noted above, the performance of the CLI depends on the predictive performance of its components. Table 2 shows that most components have not performed well at the two farm sector driven cycles (in bold). This is particularly obvious with the trade factor and the two expectations series.

TABLE 2. LEADS AND LAGS OF INDIVIDUAL COMPONENTS OF THE CLI AS AT THE MARCH QUARTER 1997

		Trade Factor	Prod. Expect.	Bus. Expect.	Job. Vac.	U.S. GDP	Housing Finance	All Ind. Index	Inv. Real Int. Rate
Jun 72	Trough	2	2	3		2		3	7
Dec 73	Peak	0	3	5		2		3	6
Sep 75	Trough	1	3	5		2		3	5
Sep 76	Peak	1	-	-		1		2	6
Dec 77	**Trough**	**1**	**-**	**-**		**-1**	**-1**	**2**	**2**
Dec 78	**Peak**	**-1**	**-**	**-**		**0**	**-**	**1**	**-**
Jun 80	**Trough**	**-**	**-**	**-**		**-1**	**-**	**3**	**-**
Dec 81	Peak	-	3	3	0	2	5	2	8
Mar 83	Trough	1	1	2	-2	1	2	1	6
Sep 85	Peak	3	0	7	1	5	1	7	11
Dec 86	Trough	0	1	2	-4	-1	2	4	7
Dec 89	Peak	5	5	5	2	-2	5	0	6
Jun 91	Trough	2	2	6	0	0	2	2	8
Jun 94	**Peak**	**-2**	**0**	**0**	**-1**	**-1**	**1**	**1**	**3**
Jun 95	**Trough**	**0**	**-4**	**-1**	**-6**	**-1**	**0**	**1**	**2**
Mar 96	**Peak**	**-**	**-**	**-**	**-**	**-3**	**-**	**-**	**1**

The **trade factor** is defined as the ratio between commodity prices (in Special Drawing Rights (SDR) terms) and the producer price index of imported materials, and gives an early estimation of terms of trade. Although terms of trade has generally led the **reference series**, it lagged at turning points which are driven by cycles in the farm sector. Since the trade factor component is a proxy for terms of trade, it showed similar results.

The two expectations series, **production** and **business expectations**, have shown reasonably consistent leads throughout the series, with the exception of the two farm sector driven cycles. The source of these expectations series is the **Australian Chamber of Commerce and Industry and Westpac Banking Corporation, Survey of Industrial Trends**. Given that this is largely a survey of manufacturers, it is not unreasonable for the expectations series not to perform well in predicting turning points which are driven by the farm sector.

The **job vacancies** component has shown a long lag against the **reference series** in the current farm cycle. This component comes from the **ABS Job Vacancies and Overtime Survey**, and this survey excludes, amongst other things, businesses primarily engaged in the agricultural, forestry and fishing industry. Therefore, this component may pick up the changes in the pressure

on production capacity after the effect of the farm cycle has fed into other sectors of the economy. Unfortunately, this series only started in the March quarter 1980, and hence missed the farm cycle in the **reference series** in the mid to late 1970s. Therefore, comparisons between two farm cycles cannot be made until there is a another farm cycle in the **reference series**.

The **US GDP** component lagged the **reference series** at both of the farm cycles, but the turning points in the two series were being driven by different factors. For example, the 1995 trough in the **reference series** has seemingly led the US cycle by one quarter, and was largely attributable to the breaking of the drought in the eastern States of Australia. The improvement in the US GDP in the second half of 1995 largely reflected growth in their exports, as the Mexican economy began to recover, as well as a recovery in residential construction, owing to the sharp reversal of the 1994 increase in long-term interest rates. (OECD, **Economic Outlook**, December 1995.)

In the non-farm cycles in Australia, the US GDP component has a better chance of leading the **reference series**. A recent study by the **Reserve Bank of Australia** has identified that there are two mechanisms by which the US business cycles can influence and lead the Australian business cycle. The first mechanism is via their demand for Australian exports, and the second is via the impact of the US share market on the Australian share market, as the two countries' share markets are closely correlated.

Notwithstanding the results from this study, it should be remembered that the US GDP component and the **reference series** represent the business cycles in two completely separate economies. Anecdotal evidence suggests that domestic factors can often play a more important part than external forces in 'creating' turning points in the business cycles. Therefore, while there are mechanisms for the US business cycle to influence and lead the Australian business cycle, it may not do so consistently at each and every turning point.

Housing finance is another component that is unlikely to predict farm cycles, as seen in both of the farm cycles in the **reference series**.

This component only covers housing finance for owner occupied properties. Its performance is affected both by the level of economic activity and the inflationary pressure in the economy. In a high inflation environment, for those who can afford the high mortgage repayments associated with the high interest rates, there may be an incentive to own rather than rent. Since a house is the often the largest asset of a household, owning a house is one way in which the household can protect its savings from the effects of inflation. Moreover, there is no tax on the capital gains from the household's principal place of residence in Australia. In a low inflation environment, the nominal house price increases are much smaller, and lower. Capital losses are possible if there is an over supply of houses in the market. Consequently, some people, especially those who do not intend to live in the same property for a long time, may find it more advantageous to rent, even if they were in the position to buy a property. However, for others, lower inflation means there is less front-end loading of mortgage repayment. This makes mortgages more affordable and allows larger loans to be taken on. On balance, although housing finance will continue to be an indicator of internal demand in the current low inflation environment, it remains to be seen whether it will continue to lead the as well as it did in the late 1970s and 1980s.

The **All Industrials Index** is an indicator of market confidence. Until recently it has consistently led the **reference series**, apart from a coincidence at the December quarter 1989 peak. The seven quarters lead at the September quarter 1985 peak in the is much longer than usual, and may be attributed to the double turn in the **reference series**. However, so far it has not yet shown a turning point corresponding to the March quarter 1996 peak. It is unclear why this has happened.

INTEREST RATE BEHAVIOUR

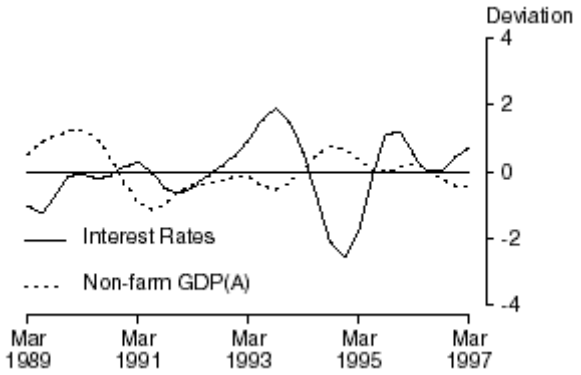
Table 2 shows that apart from the farm cycle in the mid to late 1970s, the **inverted real interest rate** component had led the **reference series** by six quarters on average until the early 1990s. Even at the first two turning points in the **reference series** in the early 1970s when inflation and interest rates were low, this component led the **reference series** by seven and six quarters respectively. This is consistent with the traditional view that the true response time to monetary policy is between four to six quarters.

In monitoring the performance of the CLI and its component, it was observed that the average lead time of the **inverted real interest rate** component at the last three turning points in the **reference series** has reduced to just two quarters. It has been noted by economic commentators, including the Reserve Bank of Australia, that the economy has become more responsive in the 1990s to changes in monetary policy. The reasons suggested for the increased responsiveness include greater transparency of the monetary policy process, and a low inflation environment in the 1990s, while the memory of the recession of the early 1990s, and the high interest rates which accompanied it are still relatively fresh on people's minds. Both of these appear to have sharpened the signaling aspect of monetary policy.

However, the inverted real interest rate component continues to show a long lead when put against non-farm GDP(A), as shown in Graph 4. It led four quarters at the September quarter 1994 peak, and would lead the forthcoming trough in non-farm GDP(A) by at least eight quarters. Two other historical turning points in the inverted real interest rate component increased their lead time by one quarter when put against non-farm GDP(A): the December quarter 1978 peak shows a one quarter lead, and the September quarter 1981 trough shows a seven quarter lead. All other historical turning points remained unchanged.

GRAPH 4. INVERTED REAL INTEREST RATE AND NON-FARM GDP(A)

Deviation from historical long-term trend

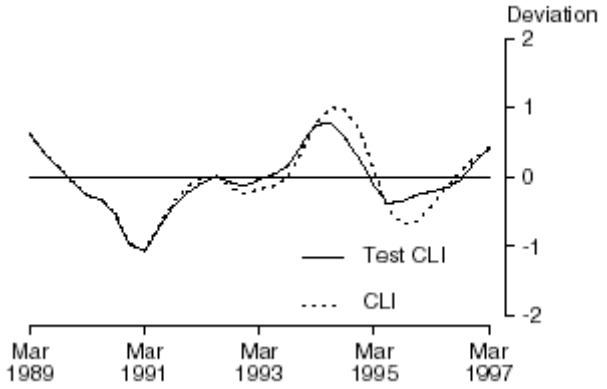


The results appear to suggest that the reduction in lead time for the inverted real interest rate component against the **reference series** in the latest cycle may not be solely due to changed responsiveness to monetary policy; some interaction with the farm cycle may also have contributed to the change. Overall, it remains to be seen whether the increased responsiveness to the **reference series** will remain as a permanent feature.

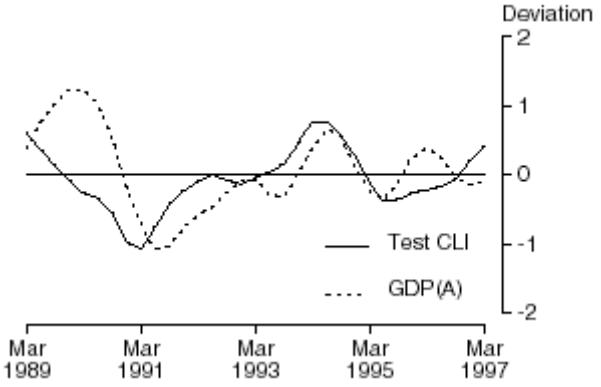
Nevertheless, the ABS has tested whether the CLI would have performed better in the latest cycle if no lag were imposed on the inverted real interest rate component in the 1990s. Graph 5 shows the two CLI series: the dotted line is the current CLI and the solid line is test version CLI without the usual four quarter lag applied to the inverted real interest rate component for periods after September 1991. The effect of this change would leave the June quarter 1994 turning point unchanged (coincident with the), and shift the September quarter 1995 trough June 1995, changing it from lagging one quarter to coincident with the **reference series**, as shown in Graph

6. However, there is still no sign of a peak corresponding to the March quarter 1996 peak in the **reference series**. All other historical turning points remained unchanged.

GRAPH 5. COMPOSITE LEADING INDICATOR
Deviation from historical long-term trend



GRAPH 6. TEST COMPOSITE LEADING INDICATOR AND GDP(A)
Deviation from historical long-term trend



CONCLUSION

From the beginning of the 1970s to the early 1990s the CLI has maintained a two quarters lead on average relative to the **reference series**. However, its performance appears to have deteriorated during the 1990s. The main reason for this is that the cycle between June 1994 and March 1996 is largely driven by the farm sector. Most components in the CLI have not performed well in a predictive sense during this cycle, and similar poor performances were also shown in the previous farm cycle in the mid to late 1970s. However, when put against non-farm GDP(A), the CLI shows a long lead in the current cycle, possibly attributable to the double turn in non-farm GDP(A).

Possible strategies to improve the CLI performances have been examined. The first is to include a farm production component so that the CLI could pick up farm cycles. However, farm cycles are quite infrequent, and it was found that the inclusion of such variable is likely to worsen the performance of the CLI during non-farm cycles. Another improvement investigated stemmed from the belief that the responsiveness to monetary policy has increased, and hence reducing the lag currently imposed on the inverted real interest rate component may be appropriate. However, analysis against non-farm GDP(A) indicates that this responsiveness may not have changed substantially in the non-farm sector, and the changed relationship observed may be an interaction with the farm cycle. For this reason the current lag of four quarters will be maintained.

This analysis highlights the very different pattern of leads and lags during periods when the reference cycle is driven by the farm sector. In future, the CLI will be published against both the current and the non-farm component.

This analysis also highlights that relationships between the CLI component series and the reference cycle vary according to the nature of the cycles and care is needed in the interpretation and use of leading indicators of this sort. On the positive side, the failure of a leading indicator to lead a **reference series** can give early warning of a changing set of relationships within the economy.

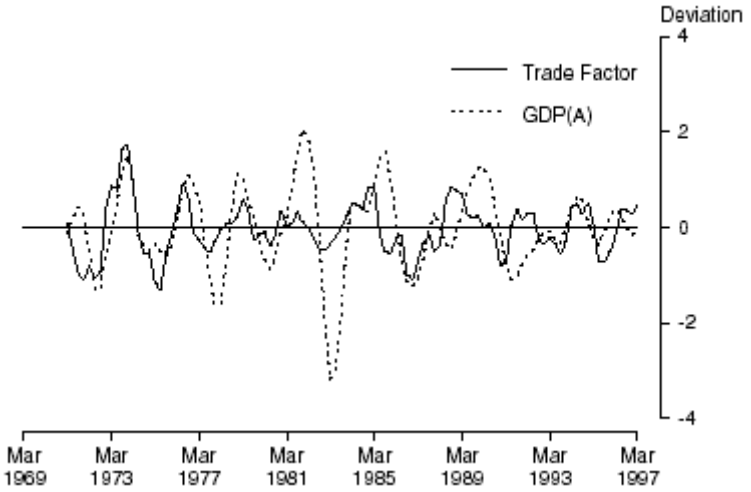
For further information about this article or the CLI in general, contact Cynthia Kim, Australian Economic Indicators on (02) 6252 6114.

REFERENCES

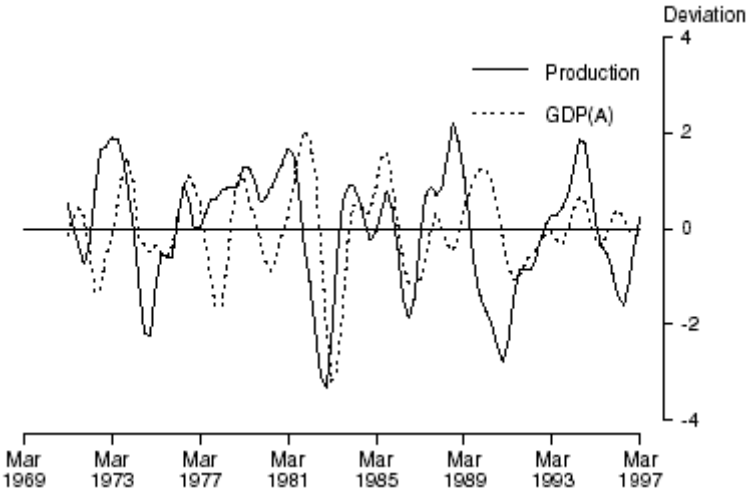
- ABS, An Experimental Composite Leading Indicator of Australian Economic Activity, Cat. No. 1347.0.
- de Roos, N. and Russell, B., **Towards an Understanding of Australia's Co-movement with Foreign Business Cycles**, Research Discussion Paper 9607, Reserve Bank of Australia, November 1996.
- OECD, **Economy Outlook**, June 1986 to December 1996.
- Reserve Bank of Australia, **Report and Financial Statements**, 1996.
- Reserve Bank of Australia, **Trends in the Housing Sector**, Reserve Bank of Australia Bulletin, 1-9, September 1995.

APPENDIX

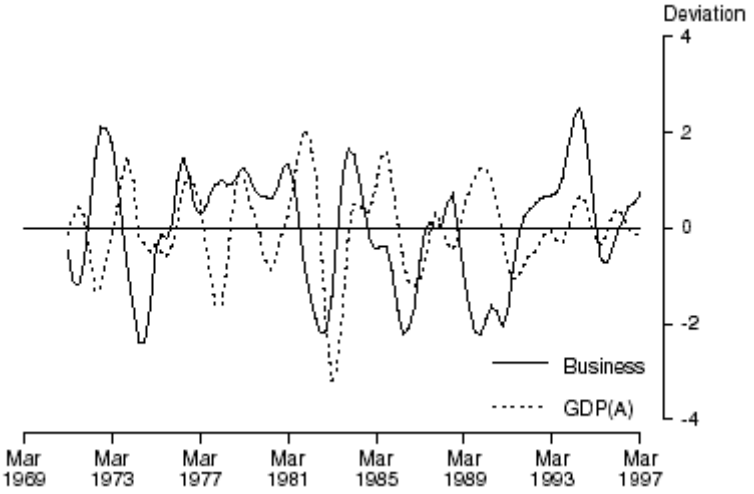
GRAPH 7. TRADE FACTOR AND GDP(A)
Deviation from historical long-term trend



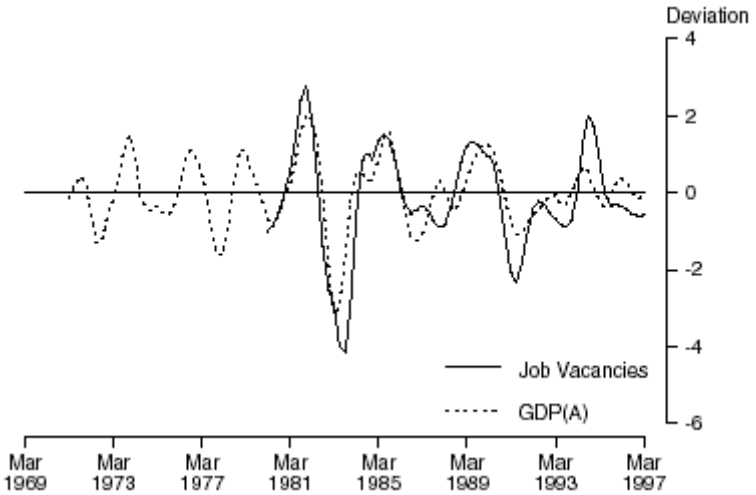
GRAPH 8. PRODUCTION EXPECTATIONS (TREND) AND GDP(A)
Deviation from historical long-term trend



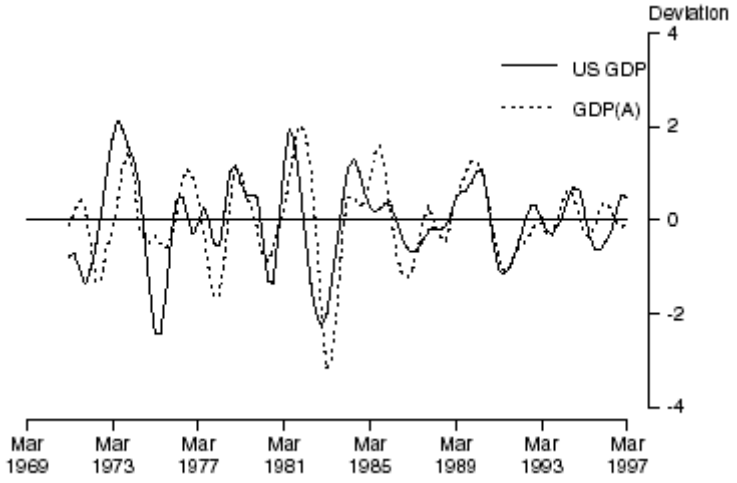
GRAPH 9. BUINESS EXPECTATIONS (TREND) AND GDP(A)
Deviation from historical long-term trend



GRAPH 10. JOB VACANCIES AND GDP(A)
Deviation from historical long-term trend

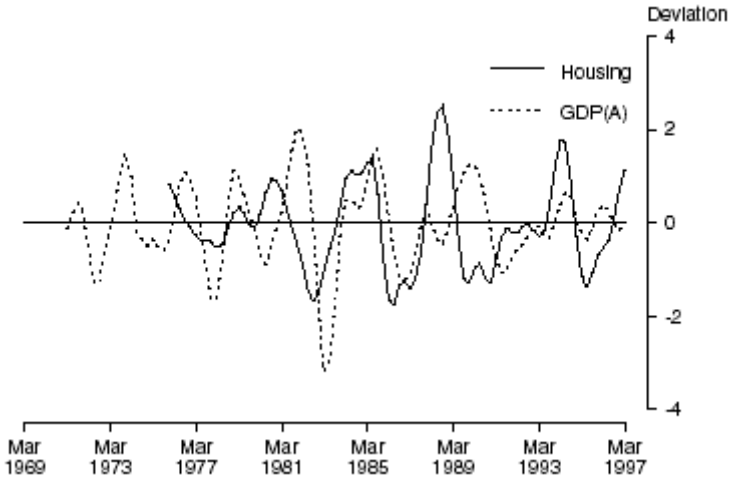


GRAPH 11. UNITED STATES GDP AND GDP(A)
Deviation from historical long-term trend



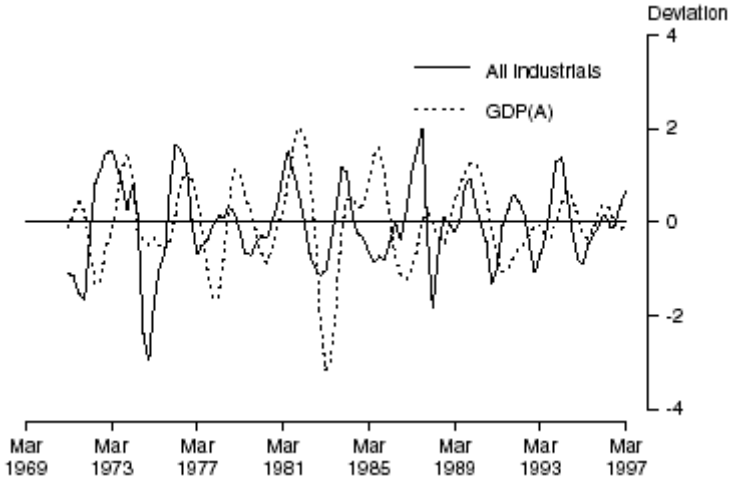
GRAPH 12. SECURED HOUSING FINANCE COMMITMENTS AND GDP(A)

Deviation from historical long-term trend



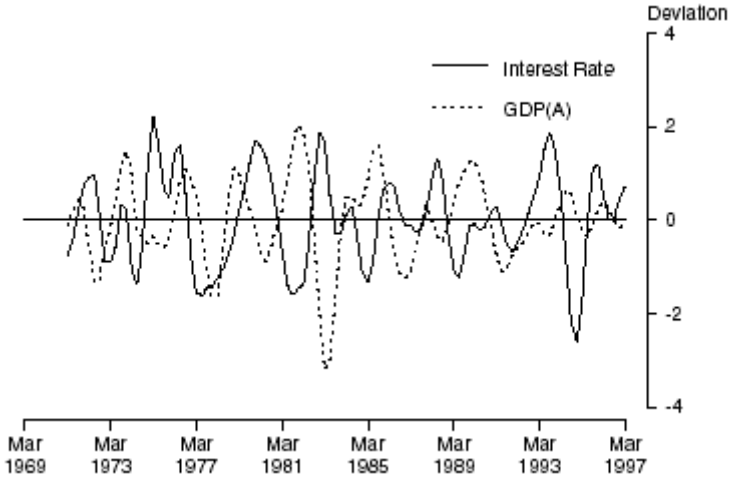
GRAPH 13. ALL INDUSTRIALS INDEX AND GDP(A)

Deviation from historical long-term trend



GRAPH 14. INVERTED REAL INTEREST RATE AND GDP(A)

Deviation from historical long-term trend



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